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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole 30-12-03

Borehole Information

Farm :	C	**Tank :**	C-112	**Site Number :**	299-E27-108
N-Coord :	43,088	**W-Coord :**	48,352	**TOC Elevation :**	645.00
Water Level, ft :	39.50	**Date Drilled :**	4/30/1975		

Casing Record

Type :	Steel-welded	Thickness, in. :	0.280	ID, in. :	6
Top Depth, ft. :	0	Bottom Depth, ft. :	97		

Borehole Notes:

A driller's log was not available for this borehole. According to Chamness and Merz (1993), this borehole was drilled in April 1975 and completed to a depth of 100 ft with 6-in.-diameter casing. Chamness and Merz (1993) make no mention of perforations or grouting; therefore, it is assumed that the casing was not perforated or grouted. The casing thickness is assumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. casing.

The top of the casing is the zero reference for the log. The casing lip is approximately even with the ground surface.

The borehole was filled with water at the time of the second logging event from 39.5 to 98 ft (the bottom of the logged interval).

Equipment Information

Logging System :	1B/2	**Detector Type :**	HPGe	**Detector Efficiency:**	35.0 %
Calibration Date :	02/1997	**Calibration Reference :**	GJO-HAN-13	**Logging Procedure :**	P-GJPO-1783

Log Run Information

Log Run Number :	1	**Log Run Date :**	03/13/1997	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	0.0	**Counting Time, sec.:**	100	**L/R :** L **Shield :**	N
Finish Depth, ft. :	10.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	2	**Log Run Date :**	03/14/1997	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	34.5	**Counting Time, sec.:**	100	**L/R :** L **Shield :**	N
Finish Depth, ft. :	9.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Borehole 30-12-03

Log Event A

Log Run Number :	3	**Log Run Date :**	04/09/1997	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	30.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	59.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	4	**Log Run Date :**	04/10/1997	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	98.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	58.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	5	**Log Run Date :**	04/10/1997	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	31.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	0.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Analysis Information

Analyst : S.D. Barry

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 11/12/1997

Analysis Notes :

This borehole was logged by the SGLS in five log runs. The first two log runs were conducted by the SGLS designated as Gamma 1B, and the rest were conducted by the SGLS designated as Gamma 2. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and detector efficiency, confirming that the SGLS was operating within specifications. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation. There were no fine gain adjustments made during these log runs.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis. A correction factor was applied for the water-filled interval of the borehole. A correction factor for a 6-in. casing was not available. The correction factor used for the water-filled portion of the borehole was for a 7-in. casing; therefore, the radionuclide concentration values will be slightly lower than what is reported for the portion of the borehole filled with water.

The only man-made radionuclide detected around this borehole was Cs-137. The Cs-137 contamination was detected continuously from the ground surface to a depth of 8 ft, from 18 to 20 ft, 30.5 to 32 ft, 38.5 to 39.5 ft, and 46.5 to 49 ft. Isolated instances of Cs-137 contamination were detected in the intervening intervals of the borehole.

The K-40 concentrations increase at a depth of 39.5 ft (the top of the water-filled interval) and at 45 ft. From 75 to 98 ft (the bottom of the logged interval), the K-40 concentration values show an increasing trend.

Except at the ground surface, the measured Cs-137 concentration values were well below the 1 count-per-second threshold for calculating shape factor SF1. Therefore, an analysis of the shape factors was not

Borehole 30-12-03

Log Event A

performed.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank C-112.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

A separate plot of the repeated segment of the log shows the concentrations of the man-made and naturally occurring radionuclides measured by measured by two different logging systems. The uncertainty of each measurement is indicated on the plot.